



RAILROAD COMMISSION OF TEXAS

SURFACE MINING AND RECLAMATION DIVISION

August 30, 2018

Sent by Email

Mr. Sid Stroud
Manager, Mine Compliance
Luminant
Environmental Services
6555 Sierra Drive
Irving, TX 75039

RE: Luminant Mining Company LLC (Luminant)
Monticello Thermo Mine, Permit No. 5G
Revision No. 36-Bonding Update


Dear Mr. Stroud:

Review of your request for the approval of Revision No. 36, submitted by letter dated July 26, 2018, is complete. A \$500 revision-application filing fee was included with the application. Revision No. 36 consists of a request for approval of an updated reclamation cost estimate and an associated bond map. Your application is considered complete and is accepted for filing.

I find that the application is not a significant revision to the approved reclamation plan at the Monticello Thermo Mine. The applicable requirements of §§12.71, 12.72, 12.142, and 12.145 have been met. Luminant's reclamation cost estimate of approximately \$17,791,518 is considered to be the minimum reclamation bond amount. The approved blanket bond in the amount of \$975,000,000 is adequate and no changes are required. The approved bond map (Plate 142-1, *Bond Map*, revised dated July 2018) is adequate. The proposed reclamation cost estimate and associated bond map are approved as submitted. The application is approved as submitted and Permit No. 5G revised accordingly.

A copy of Staff's review memorandum is enclosed. Should you have any questions, please do not hesitate to call me or Israr Anwar, Technical Coordinator for this application.

Sincerely,


for J. Denny Kingsley, P.E., Director
Surface Mining and Reclamation Division

JDK/IA/rv
Enclosure
File Reference No. 1820803



RAILROAD COMMISSION OF TEXAS

SURFACE MINING AND RECLAMATION DIVISION

MEMORANDUM

TO: J. Denny Kingsley, P.E., Director

THRU: Travis L. Wootton, Assistant Director
Timothy G. Walter, P.G., Manager, Applications and Permits *TBW*

FROM: Israr Anwar, P.E., Engineer

SUBJECT: Luminant Mining Company LLC (Luminant)
Monticello Thermo Mine, Permit No. 5G
Revision No. 36-Bonding Update

DATE: August 30, 2018

Luminant submitted Revision No. 36 by letter dated July 26, 2018. Revision No. 36 consists of a request for approval of an updated reclamation cost estimate and the associated bond map. A Form SMRD-2C and the \$500 revision-application filing fee were included with the initial application.

The following is a summary of Revision No. 36 and my technical review of the application.

PROPOSAL SUMMARY

Luminant indicates it provided an updated reclamation cost estimate and bond map to support the transfer of Luminant property to the City of Sulphur Springs and reflect recently approved release areas at the Monticello Thermo Mine.

The following information is a summary of the changes included in Revision No. 36:

Sections Revised	Title/Description of Changes
Miscellaneous	Form SMRD-2C
Section .142	Table 142-1, <i>Bond Map Summary</i> Plate 142-1, <i>Bond Map</i> , dated July 2018 Plate 142(a)-1, <i>Bond Change Map</i> , dated July 2018
Section .145	Appendix 145-H, <i>Reclamation Cost Analysis</i> , pages 145-H-1 through 17 and Appendix A, <i>Reclamation Cost Analysis, Equipment Productivity</i> , pages 145-H-A1 through A11

The proposed revision includes a request for removal of several undisturbed areas that are currently bonded at the mined or disturbed rate category, and updated Phase III release areas. Luminant's updated reclamation cost estimate in the amount of \$17,791,518, as indicated in Table I, *summary of Estimated Reclamation Costs*, (page 145-H-2).

TECHNICAL REVIEW SUMMARY

The revised reclamation cost estimate and associated bond map included in Revision No. 36 were reviewed as a revision to the approved reclamation plan at the Monticello Thermo Mine, Permit No. 5G.

The bond change map, Plate 142(a)-1, shows the proposed bond category change areas. The following table summarizes these changes:

Category Change	Proposed Acreage
Disturbed to No Bond (undisturbed)	416.0 acres
Mined to No Bond (Undisturbed)	91.7 acres
Disturbed to Phase III (Order dated March 20, 2018)	144.94 acres
Mined to Phase III (Order dated March 20, 2018)	166.47 acres
Disturbed to Phase III (Order dated April 25, 2005) *	46.7 acres

*portion of a Phase III bond release was rebonded to disturbed rate category in Revision No. 7 (approved by Order dated December 5, 2006), which is proposed to be reverting back to Phase III bond release.

The minimum required bond amount at the Monticello Thermo Mine is determined using a hybrid worst-case/area-bond method. Revision No. 36 includes Luminant's revised reclamation cost estimate of \$17,791,518, that incorporates the proposed changes. The approved reclamation cost estimate (Revision No. 28, approved administratively by letter dated February 1, 2017) is \$19,314,791. The proposed reclamation cost estimate has decreased primarily due to removal of undisturbed area from the bond and credit for additional Phase III bond release areas. The SMRD Inspection and Enforcement Staff verified (by e-mails dated August 24 and 28, 2018) that the areas are adequately bonded, including areas proposed for removal from the bond and a 46.7-acre area reverting back to Phase III release. The proposed bond map, Plate 142-1, contains accurate depictions of the bonded areas.

The amount of the bond proposed in this revision was reviewed for completeness, reflecting the probable difficulty of reclamation considering such factors as topography, geology, hydrology, and vegetation potential [§12.304(a)]. Calculated volumes appear to be accurate and consistent with past estimates. Equipment used in the estimate is consistent with equipment availability that could be utilized by a third-party contractor [§12.304(b)]. Luminant's reclamation cost estimate in the amount of \$17,791,518 should be considered the minimum required bond amount. The amount proposed is sufficient to assure the completion of the reclamation plan if the work must be performed by the Commission in the event of forfeiture. In no case is the bond for the entire area less than \$10,000.

Luminant currently has an approved blanket collateral bond for its Texas mines in the amount of \$975,000,000 (approved by Order dated September 27, 2016). The current minimum required reclamation bond amounts per mine are shown below. Luminant's collateral bond amount exceeds the sum of the estimated reclamation costs for its Texas mines by \$232,090,755. An increase to Luminant's collateral bond amount will not be required.

Mine Name	Permit Number	Reclamation Cost Estimate Date	Reclamation Cost Estimate
Big Brown Mine	3F	February 9, 2016	\$16,383,718
Martin Lake Mine	4L	February 28, 2017	\$120,349,023
Monticello Thermo Mine	5G	Pending Revision No. 36	\$17,791,518
Monticello Winfield Mine	34F	July 25, 2017	\$94,181,660
Oak Hill Mine	46C	July 5, 2017	\$149,439,526
Three Oaks Mine	48C	December 1, 2017	\$63,076,159
Bremond Mine	49B	October 25, 2016	\$3,423,560
Kosse Mine	50B	November 13, 2017	\$148,248,020
Leesburg Mine	51	May 3, 2016	\$4,886,759
Martin Lake AIV South Mine	53	June 6, 2014	\$40,448,786
Turlington Mine	54A	January 9, 2017	\$37,952,426
Monticello Thermo A-1 Area Mine	56	January 6, 2016	\$3,487,626
Liberty Mine	58	April 29, 2016	\$43,260,464
		Total Aggregate Reclamation Cost	\$742,909,245.00

Approved Collateral Bond \$975,000,000

Excess Bond Amount **232,090,755**

Based on the information provided, the approved bond amount is sufficient to cover the cost of reclamation and the requirements of §12.142(2)(C) and §12.145(b)(2) have been met.

Staff notes that an examination of the proposed changes to the cost estimate and bond map included in Revision No. 36 and the SMRD files indicates the following:

- a. No additional areas are proposed to be affected. Staff previously noted that no adverse impacts to private landowners are anticipated;
- b. No new protected cultural resource sites that will be affected;
- c. The approved probable hydrologic consequences (PHC) determination will not be affected;
- d. No operations are proposed within 300 feet of a public building, school, church, occupied dwelling, community or institutional building;
- e. No operations are proposed within 100 feet of a cemetery;
- f. No operations are proposed within 100 feet of a public road (as measured from the right of way) except as allowed in §12.71(a)(4); and
- g. No operations are proposed within or adjacent to lands within the boundaries of the National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, or the Wild and Scenic Rivers System.

The requirements of §§12.71 and 12.72 have been met.

The proposed changes to the reclamation cost estimate and associated bond map do not appear to constitute a significant revision to the approved reclamation plan in Permit No. 5G in accordance with §12.226. The applicable requirements of §§12.71, 12.72, 12.142, and 12.145, and 12.226 have been met for the changes noted. Should you have any questions, please do not hesitate to call.

A handwritten signature in blue ink, appearing to read 'Israr Anwar', is positioned above a horizontal line.

Israr Anwar, P.E.

IA/rv
Attachment
File Reference No. 1820803

Summary

Reviewer name: Israr Anwar, P.E.		
Mine Name: Thermo Mine		
Permit No.: 5G	Revision No.: 36	File Reference No.: 1820803
Description: Bonding Update		

Regulation	Meets?	Information Reviewed and/or Notes
§12.71	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Permit 5G, section .118.
§12.108	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Revision No. 36, The \$500 revision-application filing fee was provided with the application.
§12.142(2)(C) and §12.145(b)(2)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Revision No. 36, Plate 142-1, <i>Bond Map</i> , revised dated July 2018, combination of the worst-case pit and area-bond methods, bonded at combination of mined and disturbance rates.
Notes:		

Israr Anwar

From: Michael Gay
Sent: Wednesday, August 29, 2018 7:36 AM
To: Israr Anwar
Subject: RE: Data transfer location

Any time

From: Israr Anwar
Sent: Wednesday, August 29, 2018 7:27 AM
To: Michael Gay <Michael.Gay@rrc.texas.gov>
Subject: RE: Data transfer location

I have already found BR for this area. Yes it was rebonded. Thanks for ur help.
And did I mention that u r the greatest and u r DAA MAAN.

From: Michael Gay
Sent: Tuesday, August 28, 2018 2:35 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Cc: Jason Corley <Jason.Corley@rrc.texas.gov>
Subject: RE: Data transfer location

All of the black and gray areas are undisturbed. The green shaded area consists primarily of the D03 Pond. This area is heavily vegetated and stable. Monty Ward is my contact at the mine and he believes he can find the BR that this pond was originally released under (2005 maybe?). It was re-bonded when they mined the G Area to the east because of run off from the adjacent haul road.

From: Israr Anwar
Sent: Monday, August 27, 2018 8:06 AM
To: Michael Gay <Michael.Gay@rrc.texas.gov>
Subject: RE: Data transfer location

Michael, also please check Green hatch block that going to Phase III, on the change map I sent you earlier.

From: Michael Gay
Sent: Sunday, August 26, 2018 9:29 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Subject: RE: Data transfer location

I'll be there tomorrow (Monday) and will look at all that I can.

From: Israr Anwar
Sent: Friday, August 24, 2018 7:36 AM
To: Michael Gay <Michael.Gay@rrc.texas.gov>
Subject: RE: Data transfer location

Verify areas that are proposed for removal from bond. They are located around the fringes (black and gray shaded).

Israr Anwar

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Subject: RE: Data transfer location

Verify areas that are proposed for removal from bond. They are located around the fringes (black and gray shaded).

From: Michael Gay
Sent: Thursday, August 23, 2018 4:56 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Subject: RE: Data transfer location

That worked. What do you want to know about these areas?

From: Israr Anwar
Sent: Thursday, August 23, 2018 4:17 PM
To: Michael Gay <Michael.Gay@rrc.texas.gov>
Subject: RE: Data transfer location

Try this.

From: Michael Gay
Sent: Thursday, August 23, 2018 4:56 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Subject: RE: Data transfer location

That worked. What do you want to know about these areas?

From: Israr Anwar
Sent: Thursday, August 23, 2018 4:17 PM
To: Michael Gay <Michael.Gay@rrc.texas.gov>
Subject: RE: Data transfer location

Try this.

From: Michael Gay
Sent: Thursday, August 23, 2018 3:54 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Subject: RE: Data transfer location

It didn't work. Do you have an autocad file or a kmz?

From: Israr Anwar
Sent: Thursday, August 23, 2018 3:34 PM
To: Michael Gay <Michael.Gay@rrc.texas.gov>
Subject: RE: Data transfer location

It's there. Let me know if you have any trouble opening it.

From: Michael Gay
Sent: Thursday, August 23, 2018 12:29 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Subject: Data transfer location

Issy, if the files aren't too big you can save them to:

R:\Tyler Transfer Data

Otherwise they have to go to the Tyler Group in the cloud.

Michael C. Gay
903-216-1978
Natural Resource Specialist



From: Michael Gay
Sent: Thursday, August 23, 2018 3:54 PM
To: Israr Anwar <Israr.Anwar@rrc.texas.gov>
Subject: RE: Data transfer location

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Michael C. Gay
903-216-1978
Natural Resource Specialist





Sid Stroud
Manager, Mine Compliance
Environmental Services
sid.stroud@luminant.com

Luminant
6555 Sierra Drive
Irving, Texas 75039

T 214.875.9129
C 214.729.2171
F 214.875.8699

July 26, 2018

Mr. J. Denny Kingsley, P.E., Director
Surface Mining and Reclamation Division
Railroad Commission of Texas
P.O. Box 12967
Austin, Texas 78711-2967

Railroad Commission
of Texas
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JUL 27 2018

RE: Luminant Mining Company LLC ("Luminant")
Monticello-Thermo Mine, Permit No. 5G
Revision Application No. 36
Bonding Update

Surface Mining Division

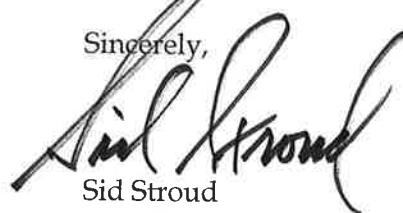
Dear Mr. Kingsley:

Luminant is transmitting with this letter three (3) copies of Revision Application No. 36 at the Monticello-Thermo Mine, Permit No. 5G. Revision Application No. 36 is seeking Commission approval to update the bonding information to support the transfer of Luminant property to the City of Sulphur Springs and to update the bonding information to reflect the recent approval of the 312.2-acre Phase III bond release package from reclamation obligations approved by Commission Order dated March 20, 2018.

Enclosed with this letter is the required permit application fee in accordance with Rule §12.108(a)(2) along with a completed SMRD-2C Form. Approval of Revision Application No. 36 is being respectfully requested from the Commission as soon as possible to facilitate the transfer of property.

Please contact Scott Mills at (214) 875-9090 if you have any questions.

Sincerely,



Sid Stroud

SS/SM/tg
Enclosure

File Ref. No. _____

Fee _____

(for official use only)

3155479

Railroad Commission

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RAILROAD COMMISSION OF TEXAS

SURFACE MINING AND RECLAMATION DIVISION

JUL 27 2018

Application for Nonsignificant Revision to Coal Mining Operations Permit

Surface Mining Division

Complete all applicable portions. Please submit three (3) copies of your application on standard size paper (8 1/2" x 11", except for maps) to the Director of the Surface Mining and Reclamation Division. See *Texas Coal Mining Regulations* and the *Texas Surface Coal Mining and Reclamation Act* for information.

Name of Applicant: Luminant Mining Company LLC

Name of Mining Operation: Thermo Mine Permit No. 5G

Permanent Mailing Address: 6555 Sierra Drive

Street or P O Box

Irving TX 75039

City State Zip Code

Contact Person Scott Mills Telephone: 214-875-9090

Revision Description Rev. 36 - Bonding Update

Type of Revision [check appropriate box(s)]

Administrative ☐ Operation Plan ☒ Reclamation Plan ☒ Incidental Boundary Revision ☐

Section of Permit to be Revised [check appropriate box(s)]

Legal, Financial and Compliance-Related Info (Administrative Information):

Right of Entry/Property	§§12.116, 12.117	<input type="checkbox"/>	Other Permits	§12.121	<input type="checkbox"/>
Ownership and Control	§12.116	<input type="checkbox"/>	Cultural Resources	§§12.125(2), 12.151	<input type="checkbox"/>
Insurance	§12.120	<input type="checkbox"/>			

Environmental Resources:

Geology/Overburden Data	§12.127	<input type="checkbox"/>	Soils	§12.134	<input type="checkbox"/>
Ground Water	§§12.128, 12.130	<input type="checkbox"/>	Land Use	§12.135	<input type="checkbox"/>
Surface Water	§§12.129, 12.130	<input type="checkbox"/>	Map/Sections/Plans	§§12.136, 12.137	<input type="checkbox"/>
Vegetation	§12.132	<input type="checkbox"/>	Prime Farmland	§12.138	<input type="checkbox"/>
Fish and Wildlife Resources	§12.133	<input type="checkbox"/>			

Operation Plan:

Mine Plan	§12.139	<input type="checkbox"/>	Maps and Plans	§12.142	<input checked="" type="checkbox"/>
Blasting	§12.141	<input type="checkbox"/>	Air Pollution Control Plan	§12.143	<input type="checkbox"/>

Reclamation Plan:

Fish & Wildlife Plan	§12.144	<input type="checkbox"/>	Ponds	§12.148	
Reclamation Timetable	§12.145(b)(1)	<input type="checkbox"/>	Temporary Impoundment		<input type="checkbox"/>
Reclamation Cost Estimate	§12.145(b)(2)	<input checked="" type="checkbox"/>	Temporary Sediment Pond		<input type="checkbox"/>
Backfilling and Grading	§12.145(b)(3)	<input type="checkbox"/>	Permanent Sediment Pond		<input type="checkbox"/>
Topsoil Handling	§12.145(b)(4)	<input type="checkbox"/>	Permanent Impoundment		<input type="checkbox"/>
Revegetation Plan	§12.145(b)(5)(A-F)	<input type="checkbox"/>	Fresh Water Diversion		<input type="checkbox"/>
Soil Monitoring Plan	§12.145(b)(5)(G)	<input type="checkbox"/>	Disturbed Water Diversion		<input type="checkbox"/>
Conservation of Coal	§12.145(b)(6)	<input type="checkbox"/>	Mining Near Underground Mining	§12.149	<input type="checkbox"/>
AFM/TFM Handling Plan	§12.145(b)(7)	<input type="checkbox"/>	Stream Diversions	§12.150	<input type="checkbox"/>
Well/Hole Plugging	§12.145(b)(8)	<input type="checkbox"/>	Relocation/Closure of Public Roads	§12.152	<input type="checkbox"/>
Hydrologic Reclamation Plan	§12.146(a)	<input type="checkbox"/>	Road Systems	§12.154	
Long-Term Ground-Water Monitoring	§12.146(b)	<input type="checkbox"/>	Temporary Ancillary Road		<input type="checkbox"/>
Long-Term Surface-Water Monitoring	§12.146(c)	<input type="checkbox"/>	Temporary Primary Road		<input type="checkbox"/>
Probable Hydrologic Consequences	§12.146(d)	<input type="checkbox"/>	Permanent Primary Road		<input type="checkbox"/>
Postmine Land Use	§12.147	<input type="checkbox"/>			

LUMINANT MINING COMPANY LLC
MONTICELLO-THERMO MINE, PERMIT No. 5G
REVISION APPLICATION No. 36

July 26, 2018

TABLE OF CONTENTS

Volume 1 of 1

Introduction: Discussion of Revision Application No. 36

Verification of Application:

Section (s): This section contains revised and/or added information

Section .142

Revised Table 142-1
Revised Plate 142-1
Revised Plate 142(a)-1

Section .145

Revised entire Appendix 145-H
(pages 145-H-1 through 145-H-17 and
pages 145-H-A1 through 145-H-A11)

Railroad Commission
of Texas
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JUL 27 2018

Surface Mining Division

LUMINANT MINING COMPANY LLC
MONTICELLO-THERMO MINE, PERMIT No. 5G
REVISION APPLICATION No. 36

July 26, 2018

INTRODUCTION

Revision Application No. 36 is being provided to the Commission seeking approval to revise and update the bonding information to support the transfer of Luminant property to the City of Sulphur Springs and to update the bonding information to reflect the recent approval of the 312.2-acre Phase III bond release package from reclamation obligations approved by Commission Order dated March 20, 2018.

The material contained within this document is fashioned similar to the approved permit application and where possible, revised and/or added material is labeled as "Revision No. 36" and should be replaced as noted in the Table of Contents of this document.

VERIFICATION OF APPLICATION

I, Scott Mills, Environmental Manager - Permitting, state that I have knowledge of the facts herein set forth, including those contained within the document titled Thermo Mine, Permit No. 5G, Revision Application No. 36, dated July 26, 2018, and that same are true and correct to the best of my information and belief.

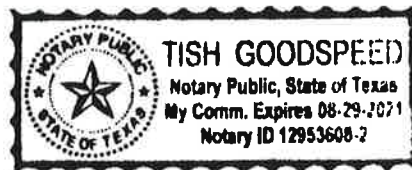
Dated this 26th day of July, 2018.

Scott Mills
Scott Mills

Before me, a Notary Public, on this day personally appeared Scott Mills, known to me to be the person whose name is subscribed to the foregoing instrument.

Given under my hand and seal of office this 26th day of July, 2018.

Tish Goodspeed
Tish Goodspeed
Notary Public, State of Texas
Expires 08/29/2021



**TABLE 142-1
BOND MAP SUMMARY***

Bond Block	Bond Status	Approval Date	Mined (& Pit) Acres	Disturbed Acres	Phase I Acres	Phase II Acres	Dist Phase I Acres	Dist Phase II Acres	Phase III Acres	Grand Total
A- 1	Disturbed	12/14/10		23.12						
A-25	Disturbed	12/14/10		27.14						
A-27	Disturbed	Proposed		51.11						
B-16	Disturbed	12/14/10		56.93						
C-15	Disturbed	08/23/04		14.42						
C-16	Disturbed	12/05/06		76.42						
C-17	Disturbed	12/05/06		33.93						
E-3C	Disturbed	12/05/06		39.30						
E-3D	Disturbed	12/05/06		73.76						
E-7	Disturbed	12/05/06		26.02						
E-8	Disturbed	12/05/06		25.82						
F-2	Disturbed	12/14/10		54.33						
F-9	Disturbed	12/14/10		8.74						
G-2	Disturbed	12/14/10		23.73						
H-2	Disturbed	12/14/10		16.95						
H-8	Disturbed	Pending		0.73						
A- 3	Mined	05/03/99	13.83							
A-28	Mined	02/01/17	20.36							
C-10	Mined	06/22/04	4.62							
C-11	Mined	06/22/04	3.09							
C-12	Mined	06/22/04	5.17							
C-13	Mined	06/22/04	2.49							
E- 2	Mined	12/10/14	24.59							
F-1	Mined	02/01/17	216.87							
F-4	Mined	06/22/04	14.75							
F-6	Mined	12/05/16	69.67							
F-7	Mined	02/01/17	8.24							
F-10	Mined	12/14/10	2.21							
F-11	Mined	12/14/10	25.52							
F-13	Mined	06/22/04	0.09							
F-14	Mined	06/22/04	7.59							
F-15	Mined	06/22/04	0.05							
F-16	Mined	02/01/17	37.33							
G-1	Mined	02/01/17	411.26							
H-1	Mined	12/14/10	139.73							
H-3	Mined	12/14/10	9.51							
H-4	Mined	12/14/10	26.92							
H-5	Mined	Pending	3.64							
H-6	Mined	02/01/17	31.56							
H-7	Mined	02/01/17	33.58							
P-2	Pit	12/14/10	65.39							
WB&G-2	Mined	12/14/10	52.20							
F-12	Phase I	03/08/11			8.48					
A-18	Phase II	06/22/04				3.23				
A-22	Phase II	12/07/01				0.69				
A-24	Phase II	12/07/01				1.74				
B- 6	Phase II	12/07/01				28.96				
B- 7	Phase II	05/21/96				27.23				
B- 8	Phase II	12/07/01				22.30				
B-13	Phase II	06/22/04				0.37				
B-15	Dist Ph II	12/05/06				0.42				
E-5	Phase III	03/08/11							78.16	
A- 4	Phase III	12/07/01							3.55	
A- 5	Phase III	12/07/01							250.46	
A- 6	Phase III	08/11/98							1.04	
A- 7	Phase III	08/11/98							11.38	
A-21	Phase III	12/07/01							5.06	
A-26	Phase III	12/07/01							3.16	
B- 1	Phase III	08/11/98							19.52	
B- 2	Phase III	08/11/98							15.16	
B- 3	Phase III	08/11/98							18.05	

**TABLE 142-1
BOND MAP SUMMARY***

Bond Block	Bond Status	Approval Date	Mined (& Pit) Acres	Disturbed Acres	Phase I Acres	Phase II Acres	Dist Phase I Acres	Dist Phase II Acres	Phase III Acres	Grand Total
B- 4	Phase III	08/11/98							64.58	
B-14	Phase III	02/01/17							21.23	
C- 1	Phase III	08/11/98							24.80	
C- 2	Phase III	08/11/98							1.52	
C- 4	Phase III	12/07/01							194.60	
C- 5	Phase III	08/11/98							31.19	
C- 6	Phase III	08/11/98							88.82	
C- 14	Phase III	05/23/03							63.23	
C-18	Phase III	12/07/01							3.64	
C-19	Phase III	Pending							46.70	
E-3A	Phase III	10/08/02							145.31	
E-3B	Phase III	10/08/02							63.17	
E-4	Phase III	04/25/05							163.85	
E-6	Phase I	04/25/05							179.35	
E-7	Phase III	02/01/17							370.81	
F-17	Phase III	Pending							144.95	

* The source of the bond blocks (and acres in each) listed in this table is Plate 142-1.

TOTAL ACRES	1230.26	552.45	8.48	84.94	0.00	0.00	2013.29	3889.42
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APPENDIX 145-H
RECLAMATION COST ANALYSIS
LUMINANT MINING COMPANY LLC
MONTICELLO-THERMO MINE
PERMIT 5G REVISION NO. 36

This report is prepared to provide a basis by which the Railroad Commission may determine a performance bond amount in accordance with §§12.304 and 12.307 for the Thermo Mine. The equipment costs used in this estimate are from the "Cost Reference Guide for Construction Equipment," an annual publication produced by Dataquest, Inc. Costs are updated annually. Equipment selection and productivity were calculated using the "Caterpillar Performance Handbook, Edition 40."

The Thermo mine is comprised of eight mining areas (A through H). Mining in all areas has been completed except for the Area H. The mining operation utilizes auxiliary equipment for overburden removal. The Thermo Mine has four recoverable lignite seams. Overburden depth averages 40 feet to lignite. The interburden thickness between the three lower seams ranges between four and thirty feet. Luminant utilizes mixed overburden as a topsoil substitute.

Reclamation costs for the surface mining operation at this mine have been classified into five work activities: (1) worst-case pit closure, (2) disturbed area leveling, (3) soil preparation, (4) revegetation, and (5) maintenance. The costs associated with each work activity are summarized in Table VIII.

Mining operations have been segregated into four general disturbance categories:

1. Worst-Case Pit Areas: Pit 13, with a length of approximately 2,625 feet and an area of approximately 65 acres, will result in the highest cost of reclamation during the proposed permit term in Area H. The entire area of Area H is also included in the worst-case pit calculations.
2. Mined Area: Includes any area where spoil is deposited after lignite removal and mined areas returned to approximate original contour (AOC). Mined area bond is also applied to previously mined areas and the area ahead of the worst-case pit that is scheduled to be mined during the proposed permit term. The activities required on mined rate acreage are soil preparation, revegetation, and maintenance.
3. Disturbed Area: Includes construction activities at sediment ponds, diversions, access roads, haul roads, and facilities where topsoil is removed but the area is not mined. The activities required on disturbed rate areas are area leveling, final grading, soil preparation, revegetation, and maintenance.
4. Ancillary Area: Includes disturbance areas where soil preparation, revegetation, and maintenance are the only reclamation activities required.

The reclamation costs for these activities are determined by the selection and summation of the work categories required to reclaim the mining related disturbance. A summary of the total estimated reclamation cost is contained in Table I. The costs for reclamation of the worst-case pit are presented in Tables II & III. The costs for area specific reclamation activities are presented in Tables IV & V. The costs for disturbed area leveling are presented in Tables VI & VII. The per-acre revegetation costs associated with mined, disturbed, ancillary, Phase I and II areas are shown in Tables VIII. Equipment and material costs used in this report are presented in Appendix A. Note: accepted mathematical rounding to one decimal place was made after each step of computation.

Table I

Summary of Estimated Reclamation Costs			
Disturbance Category ¹	Cost Per Acre	Acres ²	Estimated Cost
Worst Case Pit Closure	N/A	65.39	\$ 516,971.00
Area G B&G Reclamation Costs	N/A	0	\$ -
Area H B&G Reclamation Costs	N/A	52.20	\$ 412,686.80
Area F Suitable Material Stockpile Reclamation Costs	N/A	N/A	\$ -
Area F Overburden Stockpile Reclamation Costs	N/A	N/A	\$ -
Aux Area F Overburden Stockpile Reclamation Costs	N/A	N/A	\$ -
Area G Suitable Material Stockpile Reclamation Costs	N/A	N/A	\$ -
Area G Boxpit Spoil Stockpile Reclamation Costs	N/A	N/A	\$ -
Area G Overburden Stockpile Reclamation Costs	N/A	N/A	\$ -
Area H Suitable Material Stockpile Reclamation Costs	N/A	N/A	\$ 464,772.00
Area H Overburden Spoil Stockpile Reclamation Costs	N/A	N/A	\$ 2,332,608.00
Dewatering Well Reclamation (17wells @\$3,000/well)	N/A	N/A	\$ 51,000.00
Mined Area	\$893	1164.61	\$ 1,040,127.58
Mined Area Phase I	\$647	8.48	\$ 5,483.14
Mined Area Phase II	\$647	84.94	\$ 54,921.91
Mined Area Phase III	\$ -	2013.29	\$ -
Disturbed Area	\$20,290	552.45	\$ 11,209,106.84
Ancillary Area	\$893	0	\$ -
Disturbed Phase I	\$647	0	\$ -
Disturbed Phase II	\$647	0	\$ -
Facilities Reclamation Costs	\$ -	47.6	\$ 86,429.70
Sub-Total			\$ 16,174,106.97
Administrative Cost 10%			\$ 1,617,410.70
Total Recommended Reclamation Bond			\$ 17,791,517.67

Worst Case Pit Closure Area: Includes any overburden spoil leveling required to complete the pit closure of areas scheduled to be mined by the dragline or auxiliary equipment.

Worst Case Pit Closure Backfilling & Grading: Includes any additional pit closure reclamation that could be present for an area scheduled to be mined with the dragline in the event a backfilling & grading variance is activated for the open pit.

¹- Mined Areas: Any area where spoil is deposited, and the active pit and highwall reduction areas.

Disturbed Areas: Includes construction activities at sediment ponds, diversions, access roads, haul roads, and facilities where topsoil is removed, but the area is not mined.

Ancillary Areas: Includes disturbance areas (where topsoil is not removed) on which soil preparation and seeding are the only required reclamation activities.

²-Acreage figures were taken from Plates 142-1 and 142-2 and Table 142-1 contained in the Permit No. 5G Revision No. 36.

Worst-Case Pit

The mine plan calls for the use of auxiliary equipment such as scrapers, end-dump trucks, excavators, and front-end loaders for all mining and reclamation activities. Based on information presented in the permit renewal application, the pit width is 200 feet with an angle of repose of 34 degrees. Reclamation cost estimates are based on the worst-case scenario for the final pit. Pit 13 in Area H (Block P-2) is the worst-case pit calculation. With an average (weighted) width of 2,625 feet, Block P-2 has a measured pit length of 2,625 feet. Six cross-sections of the worst-case pit are provided, with the length of the pit represented by each cross-section in Appendix B. The cross-sections (surveyed in Pit 56 in Area F) are representative of the worst-case pits. Using the noted pit length and average pit closure width, the worst-case pit-closure surface area is estimated at 65.39 acres.

Dozers will be required for worst-case pit closure. The productivities of a dozer for the various push distances involved have been calculated in Tables A-1 and A-2. A motor grader will be used for final grading of the pit area after leveling with the dozer. The motor grader will make two passes over the leveled material at a production rate of 0.5 hours per acre (Table A-4). A motor grader with a ripper bar, ripping to a depth of 1.3 feet, will be utilized to pre-condition the area prior to soil preparation and revegetation. It will be necessary for the motor grader with ripper to make one pass over the area with a production rate of 0.8 hours per acre (Table A-5). The number of hours required for these operations are listed in the following table.

**Table II-A
Area H Pit Closure
Dozer Hour Required for Worst Case Scenario**

Cross Section ¹	Volume (bcy)	Volume ² (lcy)	Dozer Average Push ³ (ft)	Net Hourly Production ⁴ (lcy/hr)	Dozer Hours Required
a	107,730	193,914	350	358	541.7
b	57,580	103,644	350	358	289.5
c	98,959	178,127	250	515	345.9
d	180,259	324,466	250	515	630.0
e	139,577	251,238	250	515	487.8
f	47,655	85,779	150	874	98.1
	Total	1,137,168		Total Hours	2393.1

¹ Worst-case pit cross sections (Figures 145h-a1 through 1f) are located on pages 145-H-B1a through f.

² Includes 20% swell and 50% rehandle. Standard rehandle parameter from the TMRA bonding Guidelines (4/24/87) = 33%.

³ Calculated from pit cross sections (Fig. 145h-1a thru 1f) located on pages 145-H-B1a through f.

⁴ From Equipment Productivity Table A-1.

Table II-B

Grader Hour Calculations		
Acreage	Grader Hours Required	Grader w/ripper Required
65.39	39	39

Hours based on productivity factors calculated in Tables A-4 & A-5.

Table II-C

Thermo Worst Case Pit Closure Costs			
Equipment		Cost/hr	Total Cost
2394.00	D9R Dozer Hours	\$188	\$ 450,072
40.00	14M Grader Hours	\$102	\$ 4,080
40.00	14M Grader w/Ripper Hours	\$109	\$ 4,360
Acres	Activity	Cost/ac	Total Cost
65.39	Soil Prep/Reveg/Maint	\$894	\$ 58,459
Total			\$ 516,971

Area H Worst-Case Pit/Back Filling & Grading Scenario

The mine plan calls for the use of auxiliary equipment such as scrapers, end-dump trucks, excavators, and front-end loaders for all mining and reclamation activities. Based on information presented in the permit renewal application, the pit width is 200 feet with an angle of repose of 34 degrees. Approximately, 797 feet of the 1,440 feet Backfilling & Grading distance of Area H lies outside the boundary of the Area H worst-case pit (Block P-2). The area created by the backfilling & grading distance outside of the Area H worst-case pit (Block WB&G-2) has a calculated area of 52.20 acres. Block WB&G-2 will be bonded at the mined rate.

Block WB&G-2 has a southern boundary that starts at the north of the Area H worst case pit block and a northern boundary approximately 1,440 feet from the high wall coal edge of Pit 13 (the basis of the Area H worst case pit), which creates an area of approximately 52.20 acres. Since the reclamation of block WB&G-2 will occur in conjunction with the Area H worst-case pit reclamation, a ratio between the surface area of the Area H worst-case pit (65.39 acres) and the dozer hours required to reclaim the aforementioned pit (2,393 hours) was used to calculate the dozer hours to reclaim the area within the WB&G-1 bond block. Once the aforementioned ratio (36.6 hr/ac) was applied to the WB&G-2 bond block, a required dozer hour calculation of 1,911 was produced. The results of the hours and cost to reclaim Block WB&G-2 are shown in the following tables.

Table III-A

Area H B&G Grader Hour Calculations		
Acreage	Grader Hours Required	Grader w/ripper Required
52.2	32.00	32.00

Table III-B

Area H Dozer Hour Calculations	
Area H Worst Case Pit Acreage (ac)	65.39
Area H Dozer Hours (hr)	2393
Dozer Hour Ratio (hrs/ac)	36.60
Area H B&G Acreage (ac)	52.2
B&G Area Dozer Hours (hr)	1911

Table III-C

Area H B&G Reclamation Costs			
	Equipment/Activity	Cost/hr	Total Cost
1911	D9R Dozer Hours	\$188	\$ 359,268
32	14M Grader Hours	\$102	\$ 3,264
32	14M Grader w/Ripper Hours	\$109	\$ 3,488
Acres	Activity	Cost/ac	Total Cost
52.20	Soil Prep/Reveg/Maint	\$894	\$ 46,667
Total			\$ 412,687

Area H Overburden Stockpile Material Reclamation Cost

During the mining of Area H, approximately 2,300,000 lcy of material will be placed in an overburden stockpile (See Plate 139-1-5). After completion of mining in Auxiliary Area H, Luminant will begin to haul the aforementioned material from the stockpile to the final pit. This will be accomplished with loaders and end-dump trucks. The aforementioned reclamation equipment will haul overburden material to the stockpile area an average distance of 2,600 feet. The following equipment productivities have been generated to calculate the time required to transport the required suitable material.

1. Overburden Stockpile

- Loader Hours = $2,300,000 \text{ lcy} / 641 \text{ lcy/hr} = 3,589$
- Dump Truck Hours = $2,300,000 \text{ lcy} / 252 \text{ lcy/hr} = 9,127$

The parameters of the above equipment productivities can be found in Tables A-7 and A-8.

The following table displays the calculated cost for the transport of the overburden material.

Table V-A

Area H Overburden Spoil Stockpile Reclamation Costs			
Hours	Equipment	Cost/hr	Total Cost
3589	988H Loader Hours	\$165	\$ 592,185
9127	773E Dump Truck Hours	\$149	\$ 1,359,923
1522	Water Truck	\$148	\$ 225,256
1522	14M Grader	\$102	\$ 155,244
Total		\$	2,332,608

Area H Suitable Material Stockpile Reclamation Cost

In order to ensure adequate material is available to establish the top four feet of reclamation in Auxiliary Area H, Luminant will establish a 318,000 lcy and a 140,000 lcy stockpile (See Plate 139-1-5). Delivery of this material will be accomplished with loaders and end-dump trucks. The aforementioned reclamation equipment will haul suitable material to the stockpile an average haul distance of 2,600 feet. The following equipment productivities have been generated to calculate the time required to transport the required suitable material.

1. Suitable Material Stockpile

- Loader Hours = 318,000 lcy / 641 lcy/hr = 497
- Dump Truck Hours = 318,000 lcy / 252 lcy/hr = 1,262

2. Suitable Material Stockpile

- Loader Hours = 140,000 lcy / 641 lcy/hr = 219
- Dump Truck Hours = 140,000 lcy / 252 lcy/hr = 556

The parameters of the above equipment productivities can be found in Tables A-7 and A-8.

The following table displays the calculated cost for the transport of the suitable material.

Table V-B

Area H Suitable Material Stockpile Reclamation Costs			
Hours	Equipment	Cost/hr	Total Cost
716	988H Loader Hours	\$165	\$ 118,140
1818	773E Dump Truck Hours	\$149	\$ 270,882
303	Water Truck	\$148	\$ 44,844
303	14M Grader	\$102	\$ 30,906
Total			\$ 464,772

Disturbed Area Leveling

All activities which disturb land in support of mining operations will require reclamation. These disturbed areas include sedimentation ponds, diversions, and roads. The volume of material per acre that will be required to reclaim these areas is as follows:

Sediment Pond Reclamation	
Pond	Volume (ac-ft)
ALMP Sump Mod No. 1	2.1
F-01 Pond	76.8
F-01 Treatment Pond	17.9
C-06 Pond	323.1
C-04 Pond	15.2
C-04 Treatment Pond	4.8
C-05 Pond	165.4
A-18 Pond	356.8
B-17 Pond	481.4
H-01 Pond	71.2
H-01 Treatment Pond	19.8
A-1 Haul Road Temp Imp	3.1
G-13	2430
Pond Volume (ac-ft)=	3,967.6

Table VI-A

Temporary Sediment Pond Volume

Sediment Pond Vol. (ac-ft)	Sediment Pond Area (ac)	Sediment Pond Vol. (cu-yds)**
3,967.6	92.2	6401061.333

**Vol =(Sed Pond Vol ac-ft x 43,560 sf/ac)

(27 cf/cy)

Haul Roads	
Road	Length (ft)
Site Plan Haul Road	2,804
West Haul Road	5,346
A-1 Haul Road	6,786
East Haul Road	10,631
Total Haul Roads (ft)=	25,567
Total Haul Roads (miles)=	4.8

Table VI-B**Haul Road Volume (Avg. 5ft. Thickness)**

Haul Road Length (Miles)	Haul Road Area (Acres)	Haul Road Volume (cu-yds)**
4.8	47	378397.52

**Vol =(Haul Rd Dist (mi) x 5,280 ft/mi x 14.8 cy/ft)

Access Roads

Road	Length (ft)
North Entrance Road	2,314
A Area Access Road	1,432
A-18 Pond Access Road	1,647
C-06 Pond Access Road	1,564
C-07A Pond Access Road	358
F-01 Pond Access Road Mod. No. 2	2,988
H-01 Pond Access Road	837
H-01 Pond Access Road Extension	4,736
CR 2307 Ancillary Use	2,342
Total Service Roads (ft)=	18,218
Total Service Roads (miles)=	3.5

Table VI-C**Service and Access Rds Volume****(Avg. 2ft. Thickness)**

Total Road Length (Miles)	Road Area (Acres)	Svc & Acc Road Vol. (cu-yds)**
3.5	10.5	51010.4

**Vol =(Road Dist (mi) x 5,280 ft/mi x 2.8 cy/ft)

Diversions

Diversion	Length (ft)
F-05 Diversion	1,380
F-05 Diversion Extension	690
F-06 Diversion	2,540
C-01A Diversion	244

C-01B Diversion	1,338
C-06 Diversion	1,360
C-06A Diversion	408
H-01 Diversion	3,184
H-02 Diversion	864
H-03 Diversion	6,970
H-04 Diversion	1,055
Total Diversions (ft)=	20,033
Total Diversions (miles)=	3.8

Table VI-D

Diversion Volume
(Avg. 15ft. Depth)

Diversion Length (Miles)	Diversion Area (Acres)	Diversion Volume (cu-yds)**
4.00	48.5	844800

**Vol = (Div. Dist(mi) x 5,280 ft/mi x 40 cy/ft)

Table VI-E

Total Vol. To Be Reclaimed
Ponds + Total Roads + Diversions

Bond Disturbed Acres	Total Structure Vol. (cy)	Leveling Volume Per Acre	Adjusted Leveling cy/ac**
552.45	7675269.253	13893.1	18339

** Includes an estimated 20% material swell factor
and a 10% increase to address future structures submitted between calculation updates.

	Structure Buffer Distribution	
Diversions	5,756.0	feet
Haul Roads	12,135.0	feet
Access Roads	11,513.0	feet
Ponds	79.9	ac-ft
MFD's	8,750.0	feet

Scraper productivity is calculated at 280 lcy per hour (Table A-3). After soil placement with scrapers, a dozer will be required for leveling. A dozer will also be required to assist in loading the scrapers at the rate of 1 dozer hour for each 3 scraper hours. An 8,000 gallon water tanker will be used to suppress dust generated by the scrapers at the rate of 1 tanker hour for each 6 scraper hours.

Table VII-A

Scraper Hours For Dist. Area Leveling		
Cubic Yards Required Per Acre	Scraper Productivity (lcy/hr)	Scraper Hours Req'd/acre
18339	280	65.5

Hours required based on productivity factor calculated in Table A-3

Table VII-B

Dozer Hours for Disturbed Area Leveling
Dozer Hours Req'd/acre
21.8

Hours based on 1 water truck hour for every 3 required scraper hours.

Table VII-C

Water Truck Hours for Disturbed Area Leveling
Water Truck Hours Req'd/acre
10.9

Hours based on 1 water truck hour for every 6 required scraper hours.

A motor grader will make two passes over the disturbed rate areas at a production rate of 0.5 hours per acre (Table A-4). A motor grader with a ripper bar, ripping to a depth of 1.3 feet, will be utilized to pre-condition the disturbed areas prior to soil preparation and revegetation. It will be necessary for the motor grader to make one pass over the disturbed areas with a production rate of 0.8 hours per acre (Table A-5). The number of hours required for grading and ripping will be approximately:

Table VII-D

Final Grading Motor Grader Productivity		
Motor Grader Prod (hr/ac)	No. of Passes	Total Grader Prod. (hr/ac)
0.3	2	0.6

Hours based on productivity factor calculated in Table A-4

Table VII-E

Final Grading Motor Grader Productivity		
Grader w/Ripper Prod (hr/ac)	No. of Passes	Total Grader Prod. (hr/ac)
0.6	1	0.6

Hours based on productivity factor calculated in Table A-5

Soil Preparation and Revegetation

Luminant proposes the following composite postmine land uses for the Monticello-Thermo mine to be revegetated as follows:

Land Use (Permit Term)	L/U %	Native Grass	Bermuda	Trees
Pastureland (100% bermudagrass, 12.5% trees)	59.5%	0.0%	52.1%	7.4%
Fish & Wildlife (trees and shrubs)	18.5%	9.3%	0.0%	9.3%
Forestry	13.8%	0.0%	0.0%	13.8%
Developed water resources	8.1%	0.0%	0.0%	0.0%
Industrial/Commercial	0.0%	0.0%	0.0%	0.0%
Cropland	0.0%	0.0%	0.0%	0.0%
Grazingland (87.5% native grass, 12.5% trees)	0.0%	0.0%	0.0%	0.0%
Undeveloped (50% trees, 50% native gr)	0.0%	0.0%	0.0%	0.0%
	99.9%	9.3%	52.1%	30.5%

The fertilizer rates that will be used are as follows:

Initial application to all areas	=	288 lb/ac of 18-18-18
Annual application to pastureland	=	288 lb/ac of 18-18-18
Annual application to native grass areas	=	244 lb/ac of 19-19-19

For purposes of estimating revegetation costs, it will be assumed that the entire acreage will receive the same soil preparation prior to seeding or sprigging. Species will be machine and/or hand planted.

Temporary cover crops (wheat and millet) will be planted on 50.0% of the total area to be revegetated to prevent excessive erosion prior to establishing a permanent cover as follows:

Area Planted to Wheat	23.3%
Area Planted to Millet	23.3%

Since weather conditions at certain times of the year are not conducive to planting and establishment of temporary cover crops, it is assumed that 50% of the area to be revegetated will receive a mulch treatment at the rate of two tons per acre, anchored with a mulch crimper. Areas with temporary vegetation will be planted to permanent vegetation at the next available opportunity according to the season.

All pastureland areas will be planted to bermudagrass. As indicated, woody vegetation will then be planted on approximately 12.5% of the pastureland. Since planting of trees will occur within established pastureland areas, the sum of the vegetation types exceeds the portion of the area to be revegetated. Clover seed will be broadcast in pastureland areas during the fall. Fish and wildlife habitat areas will be comprised of half woody vegetation and half planted to native grasses. Forestry areas will be planted to all trees. Residential areas will be planted to bermudagrass. Developed water resources and industrial/commercial will not be revegetated.

Half of the undeveloped areas will also be planted to native grasses and half to trees. It is estimated that as much as 20% of the acreage may need to be replanted. A planting factor of 1.2 is used to account for the replanted acreage. Areas planted to bermudagrass will be fertilized and mowed once yearly during a five-year extended responsibility (ERP) period. Areas planted to native grass species will be fertilized for the first three years only and mowed twice during a five-year ERP period. Areas planted to trees will be fertilized for the first year only. It is estimated that weed control will be practiced on three occasions during a five-year ERP period.

The permittee is required to maintain the revegetated areas for a minimum of five years in the ERP. Soil tests (23-acre grids) will be conducted to identify AFM/TFM in compliance with the Regulations. Additionally, the results of the soil analyses to determine fertility needs for four years of the ERP will also be provided to the Commission. Grids of 23 acres are used to approximate the soil testing grids of 1000 ft x 1000 ft.

TABLE VIII-A

SUMMARY OF RECLAMATION COST

WORK CATEGORY	EQUIPMENT	UNITS	COST/UNIT	\$/ ACRE
DISTURBED AREA LEVELING				
	631G Scraper	65.5 hrs/ac	\$207 /hr	\$13,559
	D-9R	21.8 hrs/ac	\$188 /hr	\$4,098
	8,000 gal. Water Truck	10.9 hrs/ac	\$148 /hr	\$1,613
			SUBTOTAL	\$19,270
FINAL GRADING				
	14M Motor Grader	0.6 hrs/ac	\$102 /hr	\$61
	14M Motor Grader w/ Ripper	0.6 hrs/ac	\$109 /hr	\$65
			SUBTOTAL	\$127
SOIL PREPARATION				
	Revegetated Areas Percentage	91.9%		
	Initial Fertilizer Application to all Areas	288 lb/ac		
	Fertilizer Cost		\$0.31 /lb	\$82
	Number of Fertilizer Applications	1		
	Fertilizer Application Cost		\$4 /ac/appl	\$4
	Percentage of the Area Limed	91.9%		
	Lime Application, all areas	5 tons/ac		
	Lime Cost		\$23 /ton	\$106
	Offset Disk to Incorporate Lime	0.5 hrs/ac		
	Offset Disk Cost		\$60 /hr	\$28
	Tandem Disk for Final Seedbed Preparation	0.5 hrs/ac		
	Tandem Disk Cost		\$60 /hr	\$28
			SUBTOTAL	\$247
REVEGETATION				
	Percentage of Area to be Soil Tested	91.9%		
Initial Soil Tests	Initial Soil Test (\$252 /5.7ac grid)		\$252 /acre	\$40
	Grids/Acre	0.174		

Temporary Cover Crop in all Areas

Percentage of Revegetated Area Planted to Cover Crop (cool season)	23.0%		
Cover Crop Cost (wheat)		\$13	\$3
Tractor w/ Grain Drill for Cover Crop		\$18	\$4
Percentage of Revegetated Area Planted to Cover Crop (warm season)	23.0%		
Cover Crop Cost (millet)		\$26 /ac	\$6
Tractor w/ Grain Drill for Cover Crop		\$18 /ac	\$4
Percentage of Area for Temporary Cover Crop	45.9%		
Mulch and Tack Cost		\$200 /ac	\$92

Permanent Crop (Bermuda)

Revegetated Area w/Bermuda and Clover	59.5%		
Planting Factor	1.2		
Native Grass Mix		\$24 /ac	\$17
Tractor w/ Grain Drill Cost		\$18 /ac	\$2
Number of Mowings	1		
Mowing Cost		\$18 /ac	\$11
Clover Crop Cost		\$9 /ac/appl	\$5

Permanent Crop (native grass mix)

Percentage of Postmine Area Drilled	9.3%		
Planting Factor	1.2		
Native Grass Mix		\$65 /ac	\$7
Tractor w/ Grain Drill Cost		\$18 /ac	\$2

Permanent Trees and Shrubs

Percentage of Postmine Area to Trees and Shrubs	30.5%		
Planting Factor	1.2		
Trees and Shrubs Cost		\$85 /ac	\$31

SUBTOTAL		\$243
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MAINTENANCE 2nd thru 5th years**All Areas**

Postmine Revegetated Area Percentage	91.9%		
Soil Test 4th Year of ERP (random 10% of 5.7-ac grids)		\$25 /grid	\$4
Grids/Acre	0.174		
Soil Test - Last Four Years of Liability Period (23-ac grid)		\$72 /grid	\$3
Grids/Acre	0.044		
Number of Weed Control Applications	3		
Chemical Weed Control Cost		\$10 /ac	\$28

Permanent Crop (Burmuda)

Percentage of Postmine Area Drilled	59.5%
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Annual Fertilizer Application	288	lbs/ac		
Fertilizer Cost			\$0.31 /lb	\$212
Number of Fertilizer Applications	4			
Fertilizer Application Cost			\$4 /ac/appl	\$10
Number of Mowings	4			
Mowing Cost			\$18 /ac	\$43

Permanent Crop (native grass mix)

Percentage of Postmine Area Drilled	9.3%			
Annual Fertilizer Application	244	lbs/ac		
Number of Years of Maintenance	2			
Fertilizer Cost			\$0.31 /lb	\$14
Number of Fertilizer Applications	2			
Fertilizer Application Cost			\$4 /ac/appl	\$1
Number of Mowings	2			
Mowing Cost			\$18 /ac	\$3

Measurment of Productivity

Percentage of Postmine Area Drilled	59.5%			
Harvested Tonnage w/ Bailing	6	tons/ac		
Bailing Cost			\$24 per ton	\$86
			SUBTOTAL	\$403

Table VIII-B

ESTIMATED MINED RATE DISTURBANCE RECLAMATION COST	
WORK CATEGORY	COST PER ACRE
Soil Preparation	\$247
Revegetation	\$243
Maintenance	\$403

\$893 TOTAL**Table VIII-C**

EST. DISTURBED RATE DISTURBANCE RECLAMATION COST	
WORK CATEGORY	COST PER ACRE
Disturbed Area Leveling	\$19,270.1
Final Grading	\$126.6
Soil Preparation	\$246.5
Revegetation	\$243.4
Maintenance	\$403.2

\$20,289.8 TOTAL**Table VIII-D**

Estimated Ancillary Rate Reclamation Cost	
WORK CATEGORY	COST PER ACRE
Soil Preparation	\$247
Revegetation	\$244
Maintenance	\$403

\$893 TOTAL

APPENDIX A
RECLAMATION COST ANALYSIS
EQUIPMENT PRODUCTIVITIES

TABLE A-1

PIT CLOSURE

Productivity for Dozer Use

Earthmoving Activity - Highwall Reduction

Characterization of Dozer Used: Caterpillar D9T (w/U blade)

Description of Dozer
Route: -10% grade

Productivity Calculations

Operator Factor	0.8
Material Factor	1.0
Job Efficiency Factor	0.83 (50 min/hr)
Grade Factor	1.2
Weather Factor	1.1
Slot Dozing	1.2

Productivity Adj. Factor = $\frac{(\text{Oper. Factor} \times \text{Mat. Factor} \times \text{Job Eff. Factor} \times \text{Gr. Factor} \times \text{Slot Dozing})}{\text{Weather Factor}}$
 Productivity Adj. Factor = 0.87
 Adjusted Dozer
 Productivity = Productivity Adj. Factor x Optimum Dozer Productivity

Ave. Push Distance (ft)	Optimum Dozer Productivity (lcy/hr)	Adjusted Dozer Productivity (lcy/hr)
50	2,100	1,827
100	1,260	1,096
150	900	783
200	700	609
250	570	496
300	480	418
350	420	365
400	370	322
450	330	287
500	300	261
550	280	244

TABLE A-2

PIT CLOSURE
Productivity for Dozer Use

Earthmoving Activity - Spoil Reduction

Characterization of Dozer Used: Caterpillar D9T (w/U blade)

Description of Dozer Route: -10% grade

Productivity Calculations

Operator Factor	0.8
Material Factor	1.1
Job Efficiency Factor	0.83 (50 min/hr)
Grade Factor	1.2
Weather Factor	1.1
Slot Dozing	1.2

Productivity Adj. Factor = $(\text{Oper. Factor} \times \text{Mat. Factor} \times \text{Job Eff. Factor} \times \text{Gr. Factor} \times \text{Slot Dozing}) / \text{Weather Factor}$
 Productivity Adj. Factor = 0.96
 Adjusted Dozer Productivity = Productivity Adj. Factor x Optimum Dozer Productivity

Ave. Push Distance (ft)	Optimum Dozer Productivity (lcy/hr)	Adjusted Dozer Productivity (lcy/hr)
50	2,100	2,016
100	1,260	1,210
150	900	864
200	700	672
250	570	547
300	480	461
350	420	403
400	370	355
450	330	317
500	300	288
550	280	269

TABLE A-3

POND EMBANKMENT REDUCTION

Productivity of Scraper**Earthmoving Activity - Diversion and Pond Embankment Reduction**

Characterization of Equipment Used: Caterpillar 631G Scraper

Scraper Capacity	29 lcy (average)
Average Grade	0%
Rolling Resistance	10%
Total Resistance	10%
Job Efficiency Factor	0.83 (50 min/hr)
Weather Factor	1.1
Operator Factor	0.8
Load Time	0.6 min
Maneuver and Dump Time	0.7 min
Adjusted Hourly Productivity = $\text{Scraper Capacity} \times \text{Job Effic. Factor} \times \text{Oper. Factor} \times 60 \text{ min/hr}$ / (Total cycle Time x Weather Factor)	

Haul Distance (ft)	Loaded Trip Time	Return Trip Time	Total Cycle Time	Adjusted Scraper Productivity (lcy/hr)
500	0.75	0.50	2.55	412
900	1.40	0.85	3.55	296
1,000	1.50	0.95	3.75	280
1,200	1.80	1.10	4.20	250
1,500	2.25	1.40	4.95	212
2,000	2.95	1.75	6.00	175
2,800	4.20	2.50	8.00	131
3,200	4.70	2.80	8.80	119
4,200	6.20	3.70	11.20	94

Characterization of Push Dozer:

Caterpillar D-9T w/U Blade

Assume one dozer hour for each 3 scraper hours

Characterization of Water Truck:

8,000 Gallon Capacity Off-Highway Water Truck

Assume one water truck hour for each 6 scraper hours

TABLE A-4

FINAL GRADING
Productivity of Grader

Earthmoving Activity - Final Grading

Characterization of Equipment Used: Caterpillar 14M Grader

Final Grading after spoil leveling.

Effective blade width 12 ft
 Forward speed (ave) 3.7 mph
 Operator Factor 0.8
 Job Efficiency Factor 0.83 (50 min/hr)
 Weather Factor 1.1

$$\text{Adj. Grader Productivity} = \frac{(\text{Weather Factor} \times \text{Sf/Ac})}{(\text{Job Eff. Factor} \times \text{Op. Factor} \times \text{Blade width} \times \text{Feet/mile} \times \text{Speed})}$$

Job Eff. Factor	Operator Factor	Blade Width (ft)	Feet per Mile	Average Speed (mph)	Weather Factor	Sq. Ft. per acre	Adjusted Grader Productivity (hr/ac)
0.83	0.8	12	5,280	3.7	1.1	43,560	0.3

145-H-A4

Source: Caterpillar Performance Handbook, Edition 40.

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TABLE A-5

SUBSOIL AND TOPSOIL REPLACEMENT

Productivity of Grader w/ Ripper

Earthmoving Activity - Scarify subsoil prior to placement of topsoil

Characterization of Equipment Used: Caterpillar 14M Grader w/ripper

Ripping Depth	1.3	ft
Width per pass	8.5	ft
Average Speed	2.7	mph
Operator Factor	0.8	
Job Efficiency Factor	0.83	(50 min/hr)
Weather Factor	1.1	

Assume 1 pass over all areas prior to topsoiling or soil preparation.

Adj. Grader Productivity = (Sq. ft./ac x Weather Factor)
/ (Job Eff. Factor x Op. Factor x Width/pass x Feet/mile x Speed)

Sq. Ft. per acre	Weather Factor	Job Eff. Factor	Operator Factor	Width per Pass (ft)	Feet per Mile	Average Speed (mph)	Adjusted Grader Productivity (hr/ac)
43,560	1.1	0.83	0.8	8.5	5,280	2.7	0.6

TABLE A-6

FINAL GRADING
Productivity of Dozer

Earthmoving Activity - Final Leveling Mined Areas

Equipment Used: Caterpillar D9T w/U-blade

Final Grading Mined Acres.

Effective blade width	15	feet
Forward speed	2.4	mph
Reverse speed	5.2	mph
Operator Factor	0.8	
Job Efficiency Factor	0.83	(50 min/hr)
Weather Factor	1.1	

Forward Dozer Prod. = (sf/ac) x (job eff. factor) x (weather factor)
 /(op. factor x blade width x feet/mile x
 speed)

Sq. Ft. per acre	Job Efficiency Factor	Weather Factor	Operator Factor	Blade Width (ft)	Feet per Mile	Average Speed (mph)	Adjusted Dozer Productivity (hr/ac)
43,560	0.83	1.1	0.8	15	5,280	2.4	0.3
43,560	0.83	1.1	0.8	15	5,280	5.2	0.1
						Total	0.4

TABLE A-7

**PRODUCTIVITY FOR LOADER USE FOR
THE G-AREA, F-AREA & H-AREA RECLAMATION ACTIVITIES**

Productivity of Loader

Earthmoving Activity - Loading material from stockpile

Equipment Used: Caterpillar 988H FEL

Bucket Size	8.5	lcy
Bucket Fill Factor	1.0	
Job Efficiency Factor	0.83	(50 min/hr)
Weather Factor	1.1	
Average cycle Time	0.6	min
Adjusted Bucket Capacity	8.5	lcy

Adjusted Hourly Production = Adj. Bucket Capac. x Job Effic. Factor x 60
min/hr

/ (Ave. Cycle Time x Weather Allowance)

Adjusted Bucket Capacity (lcy)	Job Efficiency Factor	Average Cycle Time (min)	Weather Factor	Adjusted Hourly Production (lcy/hr)
8.5	0.83	0.6	1.1	641

TABLE A-8

**PRODUCTIVITY FOR HAULING USE FOR
THE G-AREA, F-AREA & H-AREA RECLAMATION ACTIVITIES**

Productivity of Dump Truck, Grader and Water Truck

Earthmoving Activity - Hauling material from Stockpile to Final Pit

Equipment Used: Caterpillar 772 Dump
Truck

Truck Capacity	34.0	lcy (average of stuck and heaped capacity)
Average Grade	0%	
Rolling Resistance	4%	
Job Efficiency Factor	0.83	(50 min/hr)
Operator Factor	0.8	
Weather Factor	1.1	
Load time (5 bucket cycles)	1.9	min
Maneuver and dump time	1.2	min

Adjusted Hourly Production = Truck Capacity x Job Eff. Factor x Operator Factor x 60 min/hr
/ (Total cycle Time x Weather Factor)

Haul Distance (ft)	Haul time (min)	Return time (min)	Total Cycle Time (min)	Adj Hourly Productivity (lcy/hr)
1,000	0.5	0.30	3.9	316
1,500	0.8	0.40	4.3	286
2,000	1.0	0.50	4.6	268
2,600	1.3	0.68	5.1	242
3,000	1.5	0.80	5.4	228
3,500	1.8	0.90	5.8	212
4,000	2.0	1.00	6.1	202
4,500	2.3	1.10	6.5	189
5,000	2.6	1.20	6.9	178
5,500	2.8	1.40	7.3	169
6,000	3.0	1.50	7.6	162
6,500	3.3	1.60	8.0	154
7,000	3.6	1.80	8.5	145

Productivity of Water Truck

Equipment Used: 8,000 gallon off-highway water tanker truck

Productivity of Grader

Equipment Used: Caterpillar 14M Grader

Assume 1 Water Truck and 1 Grader Hour per 6 Dump Truck Hours

145-H-A8

Source: *Caterpillar Performance Handbook, Edition 40.*

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Revision No. 36

TABLE A-9

HAULBACK OF SUITABLE MATERIAL

Productivity of Scraper

Earthmoving Activity - Haulback of suitable material

Characterization of Equipment Used: Caterpillar 631G Scraper

Scraper Capacity	29 lcy (average)
Average Grade	0%
Rolling Resistance	10%
Total Resistance	10%
Job Efficiency Factor	0.83 (50 min/hr)
Weather Factor	1.1
Operator Factor	0.8
Load Time	0.6 min
Maneuver and Dump Time	0.7 min
Adjusted Hourly Productivity = $\frac{\text{Scraper Capacity} \times \text{Job Effic. Factor} \times \text{Oper. Factor} \times 60 \text{ min/hr}}{(\text{Total cycle Time} \times \text{Weather Factor})}$	

Haul Distance (ft)	Loaded Trip Time	Return Trip Time	Total Cycle Time	Adjusted Scraper Productivity (lcy/hr)
1,000	1.50	0.95	3.75	280

Characterization of Push Dozer: Caterpillar D-9R w/U Blade
Assume one dozer hour for each 3 scraper hours

Characterization of Water Truck: 8,000 Gallon Capacity Off-Highway Water Truck
Assume one water truck hour for each 6 scraper hours

TABLE A-10

LEVELING OF SUITABLE MATERIAL

Productivity of Dozer

Earthmoving Activity - Leveling of suitable material

Characterization of Equipment Used: Caterpillar D9R Dozer w/ U-blade

Description of Dozer

Route 0% grade

Productivity Calculations

Operator Factor 0.8
 Material Factor 1.2
 Job Eff. Factor 0.83 (50 min/hr)
 Grade Factor 1.0
 Weather Factor 1.1

Productivity Adj Factor (Oper. Factor x Mat. Factor x Job Eff. Factor x Gr.
 Factor)/Weather Factor

Productivity Adj Factor 0.72

Adjusted Hourly Productivity = Scraper Capacity x Job Effic. Factor x Oper. Factor x 60 min/hr
 / (Total cycle Time x Weather
 Factor)

Average Push	Optimum	Adjusted Dozer Productivity (lcy/hr)
Distance (ft)	Dozer Productivity (lcy/hr)	
50	2,200	1,584
100	1,300	936
150	920	662

Table IX
EQUIPMENT AND MATERIALS COST SUMMARY

Equipment or Material	Cost	
Caterpillar D-9R Dozer	\$188	/hr
Caterpillar D-9R Dozer w/ ripper	\$206	/hr
Caterpillar 631G Scraper	\$207	/hr
Caterpillar 988H Loader	\$165	/hr
Caterpillar 773E Dump Truck	\$149	/hr
Caterpillar 14M Grader	\$102	/hr
Caterpillar 14M Grader with ripper	\$109	/hr
8,000 Gallon Water Truck	\$148	/hr
Agricultural Tractor w/ Offset Disk (0.5 hrs/ac)	\$60	/hr
Agricultural Tractor w/ Tandem Disk (0.5 hrs/ac)	\$60	/hr
Agricultural Tractor w/ Sprigger	\$36	/ac
Agricultural Tractor w/ Grain Drill	\$18	/ac
Mulching and Tacking	\$200	/ac
Baling	\$24	/ton
Mowing	\$18	/ac
Broadcast Application of Clover Seed	\$4	/ac
Chemical Weed Control	\$10	/ac
Initial Soil Test	\$252	/5.7 ac grid
Soil Test - Last Four Years of Liability Period	\$72	/23 ac grid
Soil Test - fourth year of liability period	\$25	/5.7 ac grid
Planting Trees and Shrubs (including labor)	\$85	/ac
Coastal Bermuda Grass sprigs	\$24	/ac
Mixture of Native Grasses	\$65	/ac
Clover Seed Cost	\$9	/ac
Temporary Cover Crop (cool season - wheat)	\$13	/ac
Temporary Cover Crop (warm season - millet)	\$26	/ac
Fertilizer (19-19-19 or 34-0-0)	\$620	/ton
Fertilizer Application Costs	\$4	/ac
Agricultural Lime (applied)	\$23	/ton

\$0.31 /lb